

Therapeutic Abortions following Rubella Infection in Pregnancy: The Potential Impact on the Incidence of Congenital Rubella Syndrome

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Abstract: In 1977, a large rubella outbreak occurred in Hawaii. Because attack rates were high among women of childbearing age, we conducted extensive surveillance efforts to detect both pregnancies complicated by rubella and cases of congenital rubella syndrome (CRS). Initial surveillance included a survey of physicians and hospitals, review of fetal death and birth certificates, and cord blood screening for rubella-specific IgM of infants born following the epidemic. Two years after the outbreak, the medical community was again surveyed to identify affected children who were missed initially. No case of CRS was identified either shortly after the

outbreak or in the ensuing two years. In addition, none of the 5,605 cord serum samples obtained was found to contain rubella-specific IgM antibody.

Through active surveillance, we received 12 reports of rubella in pregnant women, of whom 11 elected to terminate their pregnancies. The extensive use of therapeutic abortion by exposed women may have prevented the birth of infants with CRS. Surveillance for rubella-related abortions is an important component in assessing the health impact of rubella in a community. (*Am J Public Health* 1984; 74:1249-1251.)

Introduction

In the United States, the major means of preventing congenital rubella syndrome (CRS) is the vaccination of susceptible children. In recent years it has become apparent that rubella virus infections can be independently sustained in postpubertal populations.^{1,2} This observation has led to increasing emphasis on vaccination of susceptible postpubertal females of childbearing age.³

Another means of reducing the prevalence of CRS is therapeutic abortion of women infected in the first four months of pregnancy. Because there is no formal surveillance system in the US for monitoring the number of abortions performed for rubella, the potentially important impact of abortion on the prevalence of CRS cannot be assessed. An outbreak in Hawaii offered the opportunity to study the impact of abortion following rubella exposure on the prevalence of CRS in the community.¹

Between June 1 and August 31, 1977, a rubella outbreak occurred on the island of Oahu in the State of Hawaii in which a total of 429 cases were reported. The attack rate was greatest in women 20-24 years old with almost total sparing of young school-age children.¹ Since the majority of cases occurred in the childbearing age group, special emphasis was placed on identifying women who had rubella during pregnancy and, later, on detecting congenitally infected infants.

Materials and Methods

Prenatal Rubella Surveillance

During and after the epidemic, in addition to general rubella case identification, reports of rubella during pregnancy were actively sought using the following methods:

- All obstetricians on Oahu were contacted by telephone and asked to report any case of rubella during pregnancy or therapeutic abortion performed because of maternal rubella infection;

- Hospitals were requested to report therapeutic abortions performed because of maternal rubella infection; and
- Department of Health fetal death (abortion) records were reviewed for abortion associated with maternal rubella.

Post-Epidemic Congenital Rubella Surveillance

Following the epidemic, all obstetricians, pediatricians, and family practitioners on Oahu were contacted about the increased possibility of congenital rubella infection and offered laboratory support to evaluate suspect cases.

Cord sera were collected from all babies born on Oahu from November 1977 through April 1978 (planned to encompass all women pregnant four months or less at the onset of the epidemic through those conceiving at the end of the epidemic). All cord samples were screened in the Hawaii State Laboratory for rubella hemagglutination inhibition (HI) antibody and those found positive ($HI \geq 8$) were forwarded to the Centers for Disease Control for rubella-specific IgM antibody studies. Rubella IgM antibody screening was done by the staphylococcal protein A adsorption method.⁴ Confirmatory IgM antibody assay was performed using the sucrose gradient ultracentrifugation method.⁵

Late Congenital Rubella Surveillance

Since children with only auditory, ocular, or CNS findings may not be identified in the newborn period,⁶ another search for congenitally infected infants was undertaken during the fall of 1979, two years following the epidemic.

- All Oahu pediatricians listed in the yellow pages and subspecialists likely to be consulted for complications of CRS were interviewed about children born since August 1977 for whom congenital rubella was suspected. In addition, physicians at Hawaii Crippled Children's Services and the Birth Defects Clinic at Kapiolani Children's Hospital were contacted regarding suspected CRS cases. General or family practitioners were not contacted, since children with defects of the type consistent with congenital rubella would have been likely to be referred and thus known to pediatricians or other subspecialists.
- The three virology laboratories in Honolulu were contacted regarding any laboratory results consistent

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with congenital rubella collected from any infant born since August 1977.

- Birth certificates from children born from October 1977 through May 1978 were reviewed for the diagnosis of rubella during pregnancy. In addition, both birth and infant death certificates were reviewed for the diagnosis of congenital rubella or congenital viral infection.

Results

Prenatal Rubella Surveillance

Twelve women were reported to have had rubella during pregnancy; 11 elected to terminate their pregnancies (Table 1). One woman (#5), who had serologically documented rubella at 3 1/2 months gestation, carried her pregnancy to term. The child appeared normal according to the attending pediatrician; the cord blood was negative for rubella-specific IgM. Of the twelve women reported to have rubella during pregnancy, five (41.7 per cent) had laboratory-confirmed rubella, either through four-fold titer rises (performed concurrently in the same laboratory) or rubella-specific IgM. One woman (#12) (8.3 per cent) had laboratory results inconsistent with rubella as evidenced by absence of rubella antibody seven days after rash onset. In the remaining six (50 per cent), complete laboratory results were unavailable or non-confirmatory. For one woman, no laboratory tests were performed. For three, single convalescent serum specimens showed antibody present. For two, acute and convalescent titers had been tested at different laboratories; although an apparent four-fold titer rise was observed, the results were never confirmed by testing specimens concurrently within the same laboratory.* The time of possible infection was in the first trimester for eight women and in the second trimester for three women.

TABLE 1—Rubella Reported during Pregnancy: Laboratory Findings and Pregnancy Outcome, Hawaii Rubella Outbreak, 1977

Number	Laboratory Findings		Trimester of Infection	Outcome
	Results	Classification		
1	<8	Confirmed	1	Abortion
2	128	Confirmed	1	Abortion
3	64	Confirmed	1	Abortion
4	256	Confirmed	2	Abortion
5	<8	Confirmed	1	Abortion
6	128	Confirmed	1	Abortion
7	5120	Confirmed	1	Abortion
8	Rubella-specific IgM present	Confirmed	2	Live birth normal-appearing child
9	8	Possible	1	Abortion
10	512	Possible	1	Abortion
11	320	Possible	1	Abortion
12	<8*	Possible	1	Abortion
	16	Possible	1	Abortion
	1024	Possible	1	Abortion
	<8*	Possible	1	Abortion
	32	Possible	1	Abortion
	256	Possible	2	Abortion
	None	Possible	1	Abortion
	<8	Not a case	1	Abortion

*Acute and convalescent specimens sent to different laboratories. Results were never confirmed by testing specimens concurrently.

*Since a two-fold difference is acceptable within laboratory variation, the four-fold rise between laboratories may have been spurious.

A review of the June 1977 through October 1977 fetal death records revealed only two abortions (both of which were previously known) performed for maternal rubella infection. Of the abortions complicated by maternal rubella infections that were originally reported to the Department of Health (DOH) through the prenatal rubella surveillance system, 10 had sufficient identifying information to permit tracing through DOH fetal death certificates. Of these 10, fetal death certificates were found for only eight, of which only two were reported as therapeutic. Six were reported but with no reason listed for the abortion.

Post-Epidemic Congenital Rubella Surveillance

No children born following the epidemic were identified as having CRS, either through cord blood testing for rubella-specific IgM or through other active surveillance methods. Cord-serum samples were received from 5,605 (65.6 per cent) of the 8,545 live births recorded on Oahu during the time period from November 1977 to April 1978; cord blood specimens from the remaining infants were never received by the DOH and were probably either not collected or discarded before being sent. Of the cord serum samples received for testing, 4,598 (82.0 per cent) showed detectable HI antibody. None of the cord sera was found to contain true rubella-specific IgM antibody that would have indicated congenital infection.

Late Congenital Rubella Surveillance

Interviews were completed on all physicians eligible for interview. No CRS cases were identified through interviews with pediatricians and selected subspecialists or with physicians at the Birth Defects Clinic. Review of birth and death certificates and the Hawaii Crippled Children's registry also failed to identify any children with CRS. None of the virology laboratories reported receipt of specimens suggestive of CRS.

Discussion

Despite extensive post-epidemic surveillance after a large outbreak of rubella among young adults, we did not identify any cases of CRS attributable to the epidemic. Our data suggest that this result may be due to the high rate of abortion among women who were suspected to have contracted rubella during pregnancy.

Most, if not all, cases of clinically apparent CRS should have been detected in children by two years of age through active surveillance. Inapparent congenital rubella infection should have been detected either through the cord blood screening program or through follow-up of pregnant women who were known to have rubella during pregnancy. Because cord bloods were not screened for all live births, it is possible that some infants with asymptomatic congenital infection whose mothers also had unrecognized or asymptomatic rubella during pregnancy remain unrecognized.

The role of abortion in this outbreak is difficult to extrapolate to other outbreaks since high levels of public and physician awareness through the extensive media coverage and active surveillance methods in this outbreak would be expected to lead to high rates of diagnosis while abortion was still possible.

The influence of abortion in preventing CRS in the US is unknown. Although the number of cases of CRS reported to the National Congenital Rubella Syndrome Registry has declined, there is no way to separate the effect of the rubella vaccination program from the effect of the increase in abortion on this decline.⁷

In the United Kingdom, where a surveillance system for abortion secondary to rubella infection exists, abortions for rubella disease from 1976 through 1978 exceeded CRS cases by a ratio of 10.0 to 1; abortions for rubella contact and disease exceeded cases by a ratio of 13.3 to 1.^{8,9}

In the Hawaii outbreak, only one of the 11 women undergoing an abortion had results which were clearly inconsistent with recent rubella infection. Another six had results that were uninterpretable, either because no acute phase specimen was available (three cases), no specimen was collected (one case), or because acute and convalescent specimens were sent to separate laboratories and had borderline rises (two cases). Problems with interpretation of rubella serology were also recently reported in a Chicago rubella outbreak where in two instances results were either incorrectly reported or false-positive serological results obtained.¹⁰ To avoid difficulties in interpreting laboratory results, the need for close cooperation between the physician and laboratory must be emphasized—acute and convalescent specimens must be timed appropriately and performed concurrently within the same laboratory. Attention to the detail of specimen collection is even more crucial in the endemic situation where a suggestive illness history is much less likely to be rubella.

Surveillance of CRS alone measures only a part of the impact of rubella infection in the community. This outbreak illustrates that, in addition to surveillance for CRS, an important component of detecting the impact of rubella infection in the community is to pursue and follow-up aggressively case reports of rubella and abortions for rubella in affected pregnant women.

Because early identification of the congenitally infected infant is important both to prevent spread of infection and to permit early treatment, we conducted a cord blood screening program. Mass screening for asymptomatic congenital rubella infection is not generally feasible since determination of rubella-specific IgM is relatively difficult. Little information is available from previous screening programs to indicate the value of screening following epidemics. One such mass screening program was conducted following a rubella outbreak in Casper, Wyoming.² Of the 830 pregnancies studied in that outbreak, two normal-appearing infants had rubella-specific IgM at birth. Neither infant's mother had a symptomatic rubella infection during pregnancy. The present study is, therefore, the second to suggest that such extensive

screening efforts are unlikely to have a high enough yield to warrant the expense even in an outbreak affecting primarily adults.

The 1977 Hawaii rubella epidemic and other recent outbreaks in the United States demonstrate that rubella can be transmitted among susceptible young adults. Clearly, increased emphasis should be given to vaccination of young women to reduce the endemic level of rubella as well as the prevention of periodic rubella epidemics. Only through such a combined approach of vaccination of susceptible children and of adults (particularly women of the childbearing age) can we prevent cases of CRS as well as abortions because of maternal rubella infection.

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